

# Athletic Training Services During Daily Patient Encounters: A Report From the Athletic Training Practice-Based Research Network

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**Context:** Athletic training services such as taping, wrapping, and stretching are common during routine care but rarely captured in traditional patient documentation. These clinical data are vital when determining appropriate medical coverage and demonstrating the value and worth of athletic trainers (ATs).

**Objective:** To analyze clinical data from daily encounter forms within the Athletic Training Practice-Based Research Network (AT-PBRN).

**Design:** Descriptive study.

**Setting:** Secondary school athletic training clinics.

**Patients or Other Participants:** Adolescent patients ( $n = 4888$ ; age =  $16.3 \pm 1.4$  years) seeking care from ATs.

**Main Outcome Measure(s):** We used Web-based electronic medical records from December 1, 2009, to July 1, 2015, to obtain patient characteristics via deidentified data. Descriptive data regarding practice characteristics from patient encounter forms were analyzed and reported as percentages and frequencies.

**Results:** A total of 36 245 patient encounters (mean =  $7.5 \pm 11.6$  encounters per patient) were recorded. Football, basket-

ball, soccer, track, and volleyball accounted for 85.1% of all encounters. Most encounters were for preventive services (48.8%,  $n = 22\,329$ ), followed by care for a current injury (37.2%,  $n = 17\,027$ ) and care for a new injury (13.9%,  $n = 6368$ ). Of the preventive encounters, taping (52.7%) was the most common service provided, followed by ice- or hot-pack application (25.4%) and treatment (9.6%). Taping (28.7%) was also the most common service for current injuries, followed by treatment (26.7%) and ice- or hot-pack application (26.2%).

**Conclusions:** Our findings highlight the unique role of ATs as health care providers who provide substantial preventive services to their patients. Further, these results represent one of the first attempts to describe athletic training services related to nontime-loss injuries, emphasizing the significant role that ATs play in the health care of secondary school athletes. These findings should help clinicians and administrators make more informed decisions regarding appropriate medical coverage.

**Key Words:** appropriate medical coverage, secondary schools, nontime-loss injuries

## Key Points

- Secondary school athletic trainers spend a considerable amount of time providing preventive services and managing nontime-loss injuries.
- To facilitate discussions related to appropriate medical coverage for secondary school athletes, athletic trainers should continue to characterize all aspects of clinical practice, including the effectiveness of interventions and the health outcomes of patient care.

For adolescents, participation in physical activity and sport is important in maintaining physical and psychological well-being.<sup>1,2</sup> In addition, sport participation has been associated with improved parental relationships, academic performance, and self-esteem and decreased anxiety, depression, anger, and tobacco and marijuana use.<sup>3</sup> Although sport participation has many benefits, there are also risks, including concussions, knee injuries, and ankle sprains. Due to various short- and long-term consequences associated with sport-related injuries, such as chronic pain, loss of function, and decreased health-related quality of life,<sup>4,5</sup> recent initiatives have been aimed at preventing sport-related injuries and ensuring that adolescent athletes have access to appropriate medical care during sport participation.<sup>6,7</sup> The need for appropriate medical care and coverage during sport

participation is clear, but determining the appropriate level of medical care can be challenging.

To assist health care professionals and administrators in determining appropriate medical coverage and care, several documents<sup>8–10</sup> have been released to help identify factors that may affect the quality of patient care. For example, the “Recommendations and guidelines for appropriate medical coverage of intercollegiate athletics” from the National Athletic Trainers’ Association (NATA)<sup>10</sup> includes a rating system based on injury rates, the potential for catastrophic injury, and demands on clinicians for treatment and rehabilitation tasks related to time-loss and nontime-loss injuries in various sports, along with factors such as team size, travel, season length, and staff administrative duties. Similarly, the “Summary statement: appropriate medical

**Table 1. Operational Definitions of Encounter Types**

| Reason for Visit | Definition                                                                                                                                   |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| New injury       | Patient is seeking services for an injury that has not been previously evaluated or treated (or both) by the athletic trainer                |
| Current injury   | Patient is seeking services for an injury that has been previously evaluated or is currently being treated (or both) by the athletic trainer |
| Prevention       | Patient has not suffered an injury but requires preventive services (eg, taping, maintenance therapeutic exercises)                          |

care for the secondary school-aged athlete”<sup>8</sup> and the “Interassociation consensus statement on best practices for sports medicine management for secondary schools and colleges”<sup>11</sup> call for secondary schools to develop comprehensive athlete health care administrative teams based on the demands associated with onsite injury evaluation, treatment, and rehabilitation and the development of injury- and illness-prevention strategies. Although factors such as team size and injury rates can be easily calculated by the clinician or estimated using epidemiologic data, the best way to evaluate other clinical factors, such as the overall demands of patient care, is less clear.

Recent researchers<sup>12,13</sup> have begun to characterize patient and treatment characteristics of athletic training practice, yet it is likely that these data are primarily related to time-loss injuries and capture only a small portion of the daily demands on, workload of, and tasks performed by the athletic trainer (AT). The NATA’s recently released “Secondary school value model” document<sup>14</sup> recommended that ATs supplement formal patient documentation with daily encounter or sign-in forms to record patient visits and services such as ice or heat application or injury-preventive measures (eg, taping) related to nontime-loss injuries. Clinical data associated with these daily encounters are important to investigate because they may provide insight into the overall demand and volume of patient care associated with routine athletic training clinical practice and provide context for determining the appropriate medical care and coverage for interscholastic athletics.<sup>12</sup> Therefore, the purpose of our study was to analyze clinical data from daily encounter forms in the Athletic Training Practice-Based Research Network (AT-PBRN) to characterize daily athletic training services provided by secondary school ATs.

## METHODS

### Design and Setting

This study was a retrospective analysis of deidentified patient records from a Web-based electronic medical record (EMR) system and deemed exempt by the A.T. Still University Institutional Review Board. Patient records were created by ATs who were members of the AT-PBRN and provided patient care at secondary schools. The ATs practiced in 34 secondary schools across 10 states (Arizona, California, Kansas, Massachusetts, Minnesota, Missouri, New Hampshire, New York, Utah, Wisconsin).

### Participants

Patients who received services from ATs, as recorded within the daily encounter forms of the EMR between December 1, 2009, and July 1, 2015, and participated in an interscholastic sport (Table 1) were included in this study.

## Instrumentation

Clinical data were recorded in a Web-based EMR used by all ATs in the AT-PBRN. Detailed information regarding the EMR, including standards (eg, Health Insurance Portability and Accountability Act, Safe Harbor Method) and major components of the system, required clinician training related to its use, and procedures for data quality assurance have been previously described.<sup>12,13</sup> For this study, we reviewed records from the daily encounter forms of the EMR. The daily encounter form is used by ATs to document the individual athlete encounters that occur each day; it documents services such as preventive taping and bracing and performance-enhancement activities that might not be captured in other EMR forms, such as the daily treatment note or the full evaluation form. All clinical data within the EMR are collected and organized by each unique injury. Thus, encounter data are reported by each unique injury as opposed to each unique patient (ie, patients with more than 1 injury will produce more than 1 injury record).

For each visit to the athletic training clinic, athletes signed into the EMR and selected the (a) reason for their visit or encounter type (ie, new injury, current injury, or prevention; see Table 1 for definitions of encounter types); (b) type of services received (ie, treatment, evaluation, taping, ice or hot pack, wound care, or other); and (c) body part injured. *Treatment* was operationally defined as hands-on services provided by the AT, including the use of therapeutic modalities (eg, electrical stimulation, ultrasound), therapeutic activities and exercises (eg, rehabilitation exercises), and manual therapy techniques (eg, joint mobilizations, massage). Athletes selected multiple services when necessary. For quality assurance, ATs reviewed all athletes’ entries for accuracy and corrected entries at the end of each day before formally submitting the records to the EMR. For example, if an athlete received ice or heat treatment but did not select this service, the AT added that treatment to the patient’s record. Once all entries were reviewed and updated, the AT approved the entries, and all data were submitted and locked into the system.

## Statistical Analysis

Summary statistics were calculated for all variables of interest and are reported as percentages and frequencies.

## RESULTS

### All Encounters

The AT-PBRN documented 36 245 daily patient encounters among 4888 total patients (males = 2830, females = 1993, age = 16.3 ± 1.4 years) during the study period. The

**Table 2. Patients Documented Via Daily Encounter Forms by Sport, No. (%)**

| Sport                | Males          | Females        | Total          |
|----------------------|----------------|----------------|----------------|
| Football             | 14 813 (64.3)  | 125 (0.9)      | 14 938 (41.2)  |
| Basketball           | 3012 (13.1)    | 3758 (28.4)    | 6770 (18.7)    |
| Soccer               | 1324 (5.8)     | 1991 (15.1)    | 3315 (9.1)     |
| Track                | 1036 (4.5)     | 2189 (16.6)    | 3225 (8.9)     |
| Volleyball           | 88 (0.4)       | 2560 (19.4)    | 2648 (7.3)     |
| Wrestling            | 1333 (5.8)     | 43 (0.3)       | 1376 (3.8)     |
| Softball             | 9 (0.0)        | 876 (6.6)      | 885 (2.4)      |
| Cross-country        | 202 (0.9)      | 555 (4.2)      | 757 (2.1)      |
| Baseball             | 678 (2.9)      | 13 (0.1)       | 691 (1.9)      |
| Other                | 195 (0.8)      | 235 (1.8)      | 430 (1.2)      |
| Cheerleading         | 19 (0.1)       | 403 (3.0)      | 422 (1.2)      |
| Lacrosse             | 104 (0.5)      | 83 (0.6)       | 187 (0.5)      |
| Swimming             | 43 (0.2)       | 136 (1.0)      | 179 (0.5)      |
| Hockey               | 97 (0.4)       | 51 (0.4)       | 148 (0.4)      |
| Tennis               | 39 (0.2)       | 100 (0.8)      | 139 (0.4)      |
| Badminton            | 10 (0.0)       | 51 (0.4)       | 61 (0.2)       |
| Gymnastics           | 1 (0.0)        | 43 (0.3)       | 46 (0.1)       |
| Field hockey         | 14 (0.1)       | 0 (0.0)        | 14 (0.0)       |
| Recreational athlete | 6 (0.0)        | 3 (0.0)        | 9 (0.0)        |
| Golf                 | 3 (0.0)        | 2 (0.0)        | 5 (0.0)        |
| Total                | 23 026 (100.0) | 13 219 (100.0) | 36 245 (100.0) |

mean number of encounters per patient was  $7.5 \pm 11.6$  (range = 1–152 encounters). The 5 sports resulting in the largest number of patient encounters were football, basketball, soccer, track, and volleyball, accounting for 85.1% of all encounters reported (Table 2). A total of 45 724 distinct services were provided during the daily encounters, with the 3 most frequently reported services being taping, ice- or hot-pack application, and treatment, which accounted for 80.6% of all services provided (Table 3). The reason for visit was classified for most encounters as preventive services (48.8%,  $n = 22\,329$ ), followed by care for a current injury (37.2%,  $n = 17\,027$ ) and care for new injuries (13.9%,  $n = 6368$ ; Table 4).

### Preventive Encounters

Of the preventive encounters, taping was the most common service provided, followed by ice- or hot-pack application and treatment (Table 5). Most preventive services were provided for the ankle (35.5%,  $n = 7092$ ), wrist (13.3%,  $n = 2655$ ), and knee (10.5%,  $n = 2095$ ). Preventive-taping services occurred most frequently at the ankle, wrist, thumb, finger, and knee, whereas ice- or hot-pack application was most commonly reported for the knee, calf, ankle, shoulder, and back. Treatments were most frequently given for the ankle, back, shoulder, calf, and knee.

**Table 3. Athletic Training Services Provided During Patient Encounters**

| Service         | No. (%)        |
|-----------------|----------------|
| Taping          | 17 466 (38.2)  |
| Ice or hot pack | 11 777 (25.8)  |
| Treatment       | 7604 (16.6)    |
| Evaluation      | 4981 (10.9)    |
| Other           | 2104 (4.6)     |
| Wound care      | 1792 (3.9)     |
| Total           | 45 724 (100.0) |

**Table 4. Athletic Training Services Provided by Encounter Type, No. (%)**

| Service         | Preventive     | Injury         |              |
|-----------------|----------------|----------------|--------------|
|                 |                | Current        | New          |
| Taping          | 11 757 (52.7)  | 4888 (28.7)    | 821 (12.9)   |
| Ice or hot pack | 5669 (25.4)    | 4458 (26.2)    | 1650 (25.9)  |
| Treatment       | 2148 (9.6)     | 4540 (26.7)    | 916 (14.4)   |
| Wound care      | 1248 (5.6)     | 320 (1.9)      | 224 (3.5)    |
| Other           | 804 (3.6)      | 968 (5.7)      | 332 (5.2)    |
| Evaluation      | 703 (3.1)      | 1853 (10.9)    | 2425 (38.1)  |
| Total           | 22 329 (100.0) | 17 027 (100.0) | 6368 (100.0) |

### Current Injury Encounters

Of all daily encounters for a current injury, 37.7% were associated with an injury formally recorded in the patient-documentation portion of the EMR. Regarding care for a current injury, taping was also the most common, followed by treatment and ice- or hot-pack application (Table 6). Current injury services were most frequently reported for the ankle (28.2%,  $n = 3556$ ), knee (15.7%,  $n = 1981$ ), and calf (7.3%,  $n = 921$ ). Taping services for current injuries were most frequently reported for the ankle, thumb, wrist, finger, and calf. Treatments were most commonly given for the ankle, knee, shoulder, calf, and thigh, whereas ice- or hot-pack applications were most frequently reported for the ankle, knee, back, shoulder, and thigh.

### New Injury Encounters

The most common service for a new injury was evaluation, followed by ice- or hot-pack application and treatment (Table 7). Most new injury encounters were due to injuries at the ankle (16.7%,  $n = 620$ ), knee (14.2%,  $n = 526$ ), and thigh (7.8%,  $n = 290$ ). The ankle, knee, head, shoulder, and thigh were also the most common areas of new injuries for evaluation services. Ice- or hot-pack application occurred most frequently at the ankle, knee, thigh, calf, and shoulder, whereas treatment was most commonly reported for ankle, knee, thigh, back, and calf.

## DISCUSSION

Recently, the NATA's "Secondary school value model" document<sup>14</sup> recommended the use of daily encounter forms to help better capture the demands and volume of routine clinical practice. To our knowledge, this is the first study to characterize the types of services provided to patients by secondary school ATs during daily patient encounters. Our primary finding suggests that ATs spend a considerable amount of time providing preventive services to their patients. Specifically, across the 36 000 patient encounters and 46 000 services in our investigation, almost half were related to preventive services, which included taping, ice- or hot-pack application, and treatment. The 4 domains of athletic training clinical practice related to injury management are (1) prevention, (2) clinical evaluation and diagnosis, (3) immediate care, and (4) treatment, rehabilitation, and reconditioning.<sup>15</sup> Although previous epidemiologic<sup>16–20</sup> and practice characterization<sup>12,13</sup> research has provided insight into the latter 3 domains, limited information has been available regarding preventive services. Thus, our results are important in highlighting

**Table 5. Preventive Encounters (N = 22 329): Athletic Training Services by Body Part, No. (%)<sup>a</sup>**

| Body Part       | Service            |                    |                   |                   |                   |                   |
|-----------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
|                 | Taping             | Ice or Hot Pack    | Treatment         | Wound Care        | Other             | Evaluation        |
| Ankle           | <b>6334 (53.9)</b> | <b>696 (12.3)</b>  | <b>540 (25.1)</b> | 101 (8.1)         | <b>121 (15.0)</b> | <b>109 (15.5)</b> |
| Back            | 19 (0.2)           | <b>596 (10.5)</b>  | <b>297 (13.8)</b> | 2 (0.2)           | 63 (7.8)          | 42 (6.0)          |
| Calf            | 180 (1.5)          | <b>817 (14.4)</b>  | <b>273 (12.7)</b> | 50 (4.0)          | <b>106 (13.2)</b> | <b>47 (6.7)</b>   |
| Chest           | 7 (0.1)            | 31 (0.5)           | 4 (0.2)           | 2 (0.2)           | 2 (0.2)           | 10 (1.4)          |
| Elbow           | 94 (0.8)           | 180 (3.2)          | 21 (1.0)          | <b>139 (11.1)</b> | 15 (1.9)          | 20 (2.8)          |
| Finger          | <b>438 (3.7)</b>   | 46 (0.8)           | 4 (0.2)           | <b>111 (8.9)</b>  | 1 (0.1)           | 14 (2.0)          |
| Foot            | 376 (3.2)          | 91 (1.6)           | 33 (1.5)          | <b>234 (18.8)</b> | 27 (3.4)          | 16 (2.3)          |
| Forearm         | 73 (0.6)           | 59 (1.0)           | 9 (0.4)           | 65 (5.2)          | 8 (1.0)           | 10 (1.4)          |
| General medical | 5 (0.0)            | 39 (0.7)           | 35 (1.6)          | 37 (3.0)          | <b>75 (9.3)</b>   | <b>50 (7.1)</b>   |
| Hand            | 257 (2.2)          | 71 (1.3)           | 6 (0.3)           | <b>105 (8.4)</b>  | 13 (1.6)          | 18 (2.6)          |
| Head            | 3 (0.0)            | 41 (0.7)           | 8 (0.4)           | 82 (6.6)          | 16 (2.0)          | 38 (5.4)          |
| Hip             | 16 (0.1)           | 213 (3.8)          | 94 (4.4)          | 13 (1.0)          | 57 (7.1)          | 40 (5.7)          |
| Knee            | <b>427 (3.6)</b>   | <b>1335 (23.5)</b> | <b>254 (11.8)</b> | <b>144 (11.5)</b> | <b>85 (10.6)</b>  | <b>109 (15.5)</b> |
| Neck            | 3 (0.0)            | 51 (0.9)           | 29 (1.4)          | 2 (0.2)           | 16 (2.0)          | 11 (1.6)          |
| Shoulder        | 127 (1.1)          | <b>655 (11.6)</b>  | <b>292 (13.6)</b> | 17 (1.4)          | <b>104 (12.9)</b> | <b>69 (9.8)</b>   |
| Thigh           | 46 (0.4)           | 471 (8.3)          | 213 (9.9)         | 16 (1.3)          | 64 (8.0)          | 42 (6.0)          |
| Thumb           | <b>697 (5.9)</b>   | 64 (1.1)           | 4 (0.2)           | 26 (2.1)          | 4 (0.5)           | 13 (1.8)          |
| Toe             | 119 (1.0)          | 13 (0.2)           | 4 (0.2)           | 50 (4.0)          | 6 (0.7)           | 7 (1.0)           |
| Trunk           | 3 (0.0)            | 20 (0.4)           | 7 (0.3)           | 4 (0.3)           | 2 (0.2)           | 8 (1.1)           |
| Upper arm       | 14 (0.1)           | 59 (1.0)           | 9 (0.4)           | 24 (1.9)          | 4 (0.5)           | 6 (0.9)           |
| Wrist           | <b>2519 (21.4)</b> | 121 (2.1)          | 12 (0.6)          | 24 (1.9)          | 15 (1.9)          | 24 (3.4)          |
| Total           | 11 757 (100.0)     | 5669 (100.0)       | 2148 (100.0)      | 1248 (100.0)      | 804 (100.0)       | 703 (100.0)       |

<sup>a</sup> Bold type indicates the top 5 body parts for each athletic training service type.

the unique role of ATs as health care providers who provide substantial preventive services to their patients.

Our study begins to characterize a unique component of athletic training clinical practice, yet more work is needed to capture the full scope of the prevention practice domain. Beyond taping and therapeutic exercises, ATs are often responsible for other preventive services, such as assessing field safety, fitting equipment properly, and implementing team-based injury-screening and injury-prevention sessions.<sup>8</sup> Although essential to patient safety and a primary

responsibility of ATs, these preventive services are not normally recorded in patient documentation or even on daily encounter forms. Thus, to understand the scope of the volume and demands of providing preventive services during clinical practice, future authors should aim to capture all aspects of preventive services provided by ATs.

Another unique aspect of athletic training clinical practice is the management of patients who have sustained an injury but continue to participate in a limited or unrestricted manner. Often these injuries are classified as

**Table 6. Current Injury Encounters (N = 17 027): Athletic Training Services by Body Part, No. (%)<sup>a</sup>**

| Body Part       | Service            |                    |                    |                   |                   |                  |
|-----------------|--------------------|--------------------|--------------------|-------------------|-------------------|------------------|
|                 | Taping             | Treatment          | Ice or Hot Pack    | Evaluation        | Other             | Wound Care       |
| Ankle           | <b>2335 (47.8)</b> | <b>1423 (31.3)</b> | <b>1015 (22.8)</b> | <b>402 (21.7)</b> | <b>157 (16.2)</b> | <b>42 (13.1)</b> |
| Back            | 24 (0.5)           | 284 (6.3)          | <b>467 (10.5)</b>  | <b>78 (4.2)</b>   | 79 (8.2)          | 3 (0.9)          |
| Calf            | <b>233 (4.8)</b>   | <b>382 (8.4)</b>   | 395 (8.9)          | 67 (3.6)          | 62 (6.4)          | 16 (5.0)         |
| Chest           | 11 (0.2)           | 4 (0.1)            | 8 (0.2)            | 5 (0.3)           | 3 (0.3)           | 1 (0.3)          |
| Elbow           | 48 (1.0)           | 72 (1.6)           | 89 (2.0)           | 25 (1.3)          | 12 (1.2)          | 16 (5.0)         |
| Finger          | <b>266 (5.4)</b>   | 9 (0.2)            | 28 (0.6)           | 13 (0.7)          | 9 (0.9)           | 12 (3.8)         |
| Foot            | 230 (4.7)          | 113 (2.5)          | 133 (3.0)          | 50 (2.7)          | 20 (2.1)          | <b>60 (18.8)</b> |
| Forearm         | 57 (1.2)           | 11 (0.2)           | 15 (0.3)           | 7 (0.4)           | 5 (0.5)           | <b>41 (12.8)</b> |
| General medical | 4 (0.1)            | 23 (0.5)           | 11 (0.2)           | 16 (0.9)          | 24 (2.5)          | 18 (5.6)         |
| Hand            | 173 (3.5)          | 13 (0.3)           | 22 (0.5)           | 18 (1.0)          | 5 (0.5)           | <b>23 (7.2)</b>  |
| Head            | 3 (0.1)            | 265 (5.8)          | 9 (0.2)            | <b>570 (30.8)</b> | <b>118 (12.2)</b> | 7 (2.2)          |
| Hip             | 55 (1.1)           | 159 (3.5)          | 193 (4.3)          | 48 (2.6)          | 49 (5.1)          | 1 (0.3)          |
| Knee            | 324 (6.6)          | <b>904 (19.9)</b>  | <b>1003 (22.5)</b> | <b>233 (12.6)</b> | <b>182 (18.8)</b> | <b>39 (12.2)</b> |
| Neck            | 16 (0.3)           | 42 (0.9)           | 92 (2.1)           | 11 (0.6)          | 14 (1.4)          | 0 (0.0)          |
| Shoulder        | 84 (1.7)           | <b>414 (9.1)</b>   | <b>405 (9.1)</b>   | 94 (5.1)          | <b>80 (8.3)</b>   | 11 (3.4)         |
| Thigh           | 68 (1.4)           | <b>351 (7.7)</b>   | <b>400 (9.0)</b>   | <b>129 (7.0)</b>  | <b>111 (11.5)</b> | 3 (0.9)          |
| Thumb           | <b>455 (9.3)</b>   | 8 (0.2)            | 42 (0.9)           | 18 (1.0)          | 11 (1.1)          | 10 (3.1)         |
| Toe             | 89 (1.8)           | 22 (0.5)           | 31 (0.7)           | 25 (1.3)          | 4 (0.4)           | 10 (3.1)         |
| Trunk           | 2 (0.0)            | 7 (0.2)            | 19 (0.4)           | 10 (0.5)          | 0 (0.0)           | 0 (0.0)          |
| Upper arm       | 12 (0.2)           | 12 (0.3)           | 18 (0.4)           | 1 (0.1)           | 5 (0.5)           | 1 (0.3)          |
| Wrist           | <b>399 (8.2)</b>   | 22 (0.5)           | 63 (1.4)           | 33 (1.8)          | 18 (1.9)          | 6 (1.9)          |
| Total           | 4888 (100.0)       | 4540 (100.0)       | 4458 (100.0)       | 1853 (100.0)      | 968 (100.0)       | 320 (100.0)      |

<sup>a</sup> Bold type indicates the top 5 body parts for each athletic training service type.



**Table 7. New Injury Encounters (N = 6368): Athletic Training Services by Body Part, No. (%)<sup>a</sup>**

| Body Part       | Service           |                   |                   |                   |                  |                  |
|-----------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
|                 | Evaluation        | Ice or Hot Pack   | Treatment         | Taping            | Other            | Wound Care       |
| Ankle           | <b>421 (17.4)</b> | <b>311 (18.8)</b> | <b>192 (21.0)</b> | <b>255 (31.1)</b> | <b>38 (11.4)</b> | 11 (4.9)         |
| Back            | 141 (5.8)         | 127 (7.7)         | <b>86 (9.4)</b>   | 12 (1.5)          | 21 (6.3)         | 1 (0.4)          |
| Calf            | 142 (5.9)         | <b>154 (9.3)</b>  | <b>79 (8.6)</b>   | 41 (5.0)          | 27 (8.1)         | 11 (4.9)         |
| Chest           | 23 (0.9)          | 11 (0.7)          | 1 (0.1)           | 4 (0.5)           | 4 (1.2)          | 0 (0.0)          |
| Elbow           | 60 (2.5)          | 43 (2.6)          | 19 (2.1)          | 22 (2.7)          | 12 (3.6)         | 20 (8.9)         |
| Finger          | 75 (3.1)          | 35 (2.1)          | 9 (1.0)           | <b>89 (10.8)</b>  | 2 (0.6)          | <b>22 (9.8)</b>  |
| Foot            | 104 (4.3)         | 60 (3.6)          | 31 (3.4)          | 50 (6.1)          | 18 (5.4)         | <b>25 (11.2)</b> |
| Forearm         | 25 (1.0)          | 20 (1.2)          | 4 (0.4)           | 7 (0.9)           | 4 (1.2)          | 14 (6.3)         |
| General medical | 71 (2.9)          | 7 (0.4)           | 26 (2.8)          | 1 (0.1)           | <b>29 (8.7)</b>  | 12 (5.4)         |
| Hand            | 47 (1.9)          | 37 (2.2)          | 9 (1.0)           | 34 (4.1)          | 5 (1.5)          | <b>24 (10.7)</b> |
| Head            | <b>213 (8.8)</b>  | 44 (2.7)          | 17 (1.9)          | 0 (0.0)           | 23 (6.9)         | <b>27 (12.1)</b> |
| Hip             | 92 (3.8)          | 86 (5.2)          | 64 (7.0)          | 13 (1.6)          | 16 (4.8)         | 1 (0.4)          |
| Knee            | <b>372 (15.3)</b> | <b>256 (15.5)</b> | <b>125 (13.6)</b> | <b>62 (7.6)</b>   | <b>41 (12.3)</b> | <b>27 (12.1)</b> |
| Neck            | 48 (2.0)          | 31 (1.9)          | 23 (2.5)          | 2 (0.2)           | 9 (2.7)          | 0 (0.0)          |
| Shoulder        | <b>206 (8.5)</b>  | <b>146 (8.8)</b>  | 76 (8.3)          | 22 (2.7)          | <b>32 (9.6)</b>  | 6 (2.7)          |
| Thigh           | <b>188 (7.8)</b>  | <b>181 (11.0)</b> | <b>121 (13.2)</b> | 28 (3.4)          | <b>30 (9.0)</b>  | 4 (1.8)          |
| Thumb           | 63 (2.3)          | 24 (1.5)          | 7 (0.8)           | <b>80 (9.7)</b>   | 4 (1.2)          | 2 (0.9)          |
| Toe             | 33 (1.4)          | 14 (0.8)          | 2 (0.2)           | 23 (2.8)          | 2 (0.6)          | 12 (5.4)         |
| Trunk           | 13 (0.5)          | 10 (0.6)          | 6 (0.7)           | 1 (0.1)           | 1 (0.3)          | 1 (0.4)          |
| Upper arm       | 20 (0.8)          | 17 (1.0)          | 6 (0.7)           | 8 (1.0)           | 5 (1.5)          | 2 (0.9)          |
| Wrist           | 68 (2.8)          | 36 (2.2)          | 13 (1.4)          | <b>67 (8.2)</b>   | 9 (2.7)          | 2 (0.9)          |
| Total           | 2425 (100.0)      | 1650 (100.0)      | 916 (100.0)       | 821 (100.0)       | 332 (100.0)      | 224 (100.0)      |

<sup>a</sup> Bold type indicates the top 5 body parts for each athletic training service type.

*nontime-loss injuries*: the patient does not miss a practice or game and continues to participate with the injury. Athletes with nontime-loss injuries typically use athletic training services to help them continue participation, even while injured. Little is known about nontime-loss injuries, but a study of youth football suggested that nontime-loss injuries occurred in a greater percentage and at a greater rate than time-loss injuries.<sup>21</sup>

Furthermore, the authors of a recent study from the National Athletic Treatment, Injury and Outcomes Network (NATION) reported that although time-loss injuries accounted for a larger number of visits and services per injury than nontime-loss injuries, the latter required more services per visit.<sup>22</sup> Our findings regarding services for current injuries provide additional insight, as one-third of all daily encounters were related to current injuries and required taping, ice- or hot-pack application, or treatment services. Together, these results indicate that ATs may spend a considerable amount of time managing nontime-loss injuries due to the greater volume and amount of care associated with nontime-loss injuries compared with time-loss injuries. Further, in ongoing investigations<sup>23,24</sup> aimed at understanding ATs' documentation habits, the researchers reported that ATs were more likely to formally document time-loss injuries, possibly due to their perceived significance and severity, than nontime-loss injuries within the patient-documentation portion of an EMR. We noted that only 37.7% of all current injury encounters were associated with an injury that was formally documented within the patient-documentation portion of the EMR. Thus, we speculate that the remaining daily encounter cases for current injuries (62.3%; ie, injuries not documented in the patient-documentation portion of the EMR) were likely related to nontime-loss injuries. This is an important finding because it represents one of the first attempts to describe athletic training services related to nontime-loss injuries and, coupled with the preventive services, highlights the

significant role ATs play in the health care of secondary school athletes.

Nearly 8 million adolescents are estimated to be engaged in interscholastic sports.<sup>25</sup> Although sport participation offers health and wellness benefits, sport-related injury is a known risk and a growing concern. Understanding the demands of providing preventive services and managing time-loss and nontime-loss injuries can serve as the basis for discussions about appropriate medical care and may provide information about the role and workload of ATs. However, the management of injuries alone should not be the sole determining factor in decisions about appropriate medical coverage. For example, the "Summary document: appropriate medical coverage for secondary school athletes"<sup>8</sup> and the "Interassociation consensus statement on best practices for sports medicine management for secondary schools and colleges"<sup>11</sup> identified components of clinical practice that need to be considered when discussing appropriate athletic health care for interscholastic athletes. These clinical practice components include coverage of high-risk sports,<sup>18,19</sup> treatment and rehabilitation services,<sup>12,13</sup> and injury- and illness-prevention services.<sup>26,27</sup> Together with previous studies that characterized treatment and rehabilitation services in high-risk sports, our findings should help clinicians and administrators make more informed decisions about appropriate coverage at their clinical sites. For example, we found that football, basketball, soccer, track, and volleyball accounted for 85% of all daily encounters during the study period. Therefore, these sports may constitute a significant portion of the overall demand for athletic training services. Schools offering these sports will benefit from having an AT onsite to address the health care needs of their athletes. In addition, the timing of when these sports are offered during the academic year should be considered. In portions of the country where football, soccer, and volleyball are offered during the same competitive season, the demand for athletic

training services is high, and assistance should be provided when needed.

As noted in the NATA “Secondary school value model,”<sup>14</sup> documentation of athletic training services is vital to demonstrating the AT’s worth and value in terms of the cost of services provided and the perception of a service’s worth, respectively. Our study suggests that ATs may not comprehensively document the care and services they provide. For instance, although treatments for current injuries were documented on the daily encounter form, clinicians should also complete comprehensive treatment notes that include patient-rated outcomes. One benefit of onsite access to ATs is that, because they see their patients on a daily basis, monitoring the return to sport and assisting in improving performance during this important recovery time are possible. However, without the routine collection of patient-rated outcomes during care, ATs will be unable to demonstrate the effectiveness of their services and the overall quality of patient care, which are both necessary to establish worth and value.<sup>28–30</sup> Thus, as ATs continue to establish their worth and value, efforts to enhance patient documentation and collect patient-rated outcomes data are needed.

Our study had limitations. First, the daily encounter form within the EMR was developed so that ATs could quickly and easily capture services that may not necessarily require formal documentation within the EMR. Thus, many of the services captured within the daily encounter form provided general descriptions of services but not details such as specific exercises or types of treatments. As a result, specific treatments and exercises, such as preventive interventions and maintenance rehabilitation exercises, were not specified in the EMR record and, therefore, not specified in our dataset. Further, the EMR provided 6 options for reason for visit, which may not have captured all reasons for visits. Despite these limitations, we were able to analyze more than 36 000 patient encounters and provide general, useful clinical data to support important components of athletic training clinical practice that were previously limited in the literature, such as preventive services.

## CONCLUSIONS

Our study characterized the types of services provided to patients by secondary school ATs during daily patient encounters and highlighted the unique role ATs play as health care providers to secondary school athletes. Specifically, our results suggest that ATs spend a considerable amount of time providing preventive services to their patients and managing nontime-loss injuries. To our knowledge, we are the first to describe these important characteristics of athletic training clinical practice. These findings provide insight into the daily demands of routine athletic training clinical practice and should help clinicians and administrators make more informed decisions regarding appropriate medical coverage for secondary school athletes. To further facilitate discussions related to appropriate medical coverage, ATs should continue efforts to characterize all aspects of clinical practice, including the effectiveness of treatment interventions and the health outcomes of patient care.

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